

Machine translation JP09065620

CLAIMS

(19)**Publication country**Japan Patent Office (JP)
(12)**Kind of official gazette**Publication of patent applications (A)
(11)**Publication No.**JP,9-65620,A
(43)**Date of Publication**March 7, Heisei 9 (1997)
(54)**Title of the Invention**Dynamo-electric machine
(51)**International Patent Classification (6th Edition)**

H02K 13/00

5/16

11/00

19/22

FI

H02K 13/00 Z

5/16 Z

19/22

11/00 B

Request for ExaminationUnrequested

The number of claims3

Mode of ApplicationOL

Number of Pages6

(21)**Application number**Japanese Patent Application No. 7-219908

(22)**Filing date**August 29, Heisei 7 (1995)

(71)**Applicant**

Identification Number000004260

NameDenso, Inc.

Address1-1, Showa-cho, Kariya-shi, Aichi-ken

(72)**Inventor(s)**

NameMase Chapter

Address1-1, Showa-cho, Kariya-shi, Aichi-ken Inside of Nippondenso Co., Ltd.

(72)**Inventor(s)**

NameWood Seiji

Address1-1, Showa-cho, Kariya-shi, Aichi-ken Inside of Nippondenso Co., Ltd.

(72)**Inventor(s)**

NameHiroaki Kajiura

Address1-1, Showa-cho, Kariya-shi, Aichi-ken Inside of Nippondenso Co., Ltd.

(74)**Attorney**

Patent Attorney

NameKenji Ishiguro

(57) Abstract

Technical problem Though a seal ring is abolished, it is made to reduce a manufacturing cost by reducing part mark, as protection of the collector rings 7 and 8 of a couple and the brushes 51 and 52 of a couple and scattering of worn powder can be prevented.

Means for Solution The sensor magnetic pole 61 and the position sensing device 62 of the rotor position sensing device 10 required when using the generator motor 1 as an electric motor for vehicles which puts an engine into operation, A sliding portion of the collector rings 7 and 8 of a couple and the brushes 51 and 52 of a couple was surrounded by the collector ring cover part 18 by which integral moulding was carried out to the rear housing 12, and the brush holder 53 which accommodates the brushes 51 and 52 of a couple. This abolished scattering of worn powder produced by sliding with the collector rings 7 and 8 of a couple, and the brushes 51 and 52 of a couple, and a seal ring for preventing water of a sliding portion from the outside.

Claim(s)

Claim 1A dynamo-electric machine comprising:

(a) A shaft supported by housing enabling free rotation.

(b) A rotor which has a rotor core fixed to a periphery of this shaft, and the rotor coil looped around this rotor core.

(c) Contact which was provided in an outer periphery of end of said shaft, and was electrically connected to said rotor coil.

(d) contact in contact with a periphery of this contact, and (e) -- said contact -- a wrap -- it being fixed to said contact side of said shaft like, and with a sensor magnetic pole of approximate circle ring plate shape which makes magnetic flux. (f) A position sensing device of arc shape which is established so that said contact may be covered with this sensor magnetic pole, detects magnetic flux from said sensor magnetic pole, and measures a rotary place of said rotor.

Claim 2A dynamo-electric machine carrying out integral moulding of said housing to a bearing which positions said shaft, a bearing attaching part holding this bearing, and this bearing attaching part in the dynamo-electric machine according to claim 1, and having the contact-ed wrap covering section for a periphery of said contact.

Claim 3A dynamo-electric machine having the circular permanent magnet which said sensor magnetic pole was fixed to an annulus ring board which consists of magnetic materials, and said contact side of this annulus ring board in the dynamo-electric machine according to claim 1 or 2, and is an even pitch interval and was magnetized to shaft orientations in a hoop direction.

Detailed Description of the Invention**0001**

Field of the Invention In this invention, it is related with the dynamo-electric machine with which contact and brushes, such as a collector ring and a commutator, ****.

Therefore, it is especially involved in dynamo-electric machines, such as an AC generator for vehicles, an electric motor for vehicles, and a generator motor for vehicles.

0002

Description of the Prior Art From before, for example AC generator 100 for vehicles, The stator 102 held at the approximately-bowl-shaped housing 101 and the inner surface of this housing 101 as shown in drawing 4, The rotor 105 which looped the rotor coil 104 around the field core 103 turning around the inside of this stator 102, It has the shaft 106 which penetrates the central part of this rotor 105, the collector ring 107 of the couple arranged at the outer periphery of end of this shaft 106, and the brush device 108 formed in the periphery of these collector rings 107.

0003 And the brush device 108 is provided with the brush holder 112 which stores the brushes 111 of the couple which ****s on the periphery of the collector ring 107 of a couple, and these

brushes 111. Integral moulding of the wrap collector ring cover part 113 is carried out to the rear end part of the housing 101 in the collector ring 107 with the brush holder 112. Between the brush holder 112 and the collector ring cover part 113, and the rear cover 114, the seal ring 117 made of rubber which has the approximately rectangular shape part 115 and the approximately annular part 116 is put.

0004 And the collector ring 107 and the brush 111, While it is covered with the brush holder 112, the collector ring cover part 113, and the seal ring 117 and is protected from water and a foreign matter, the worn powder by which it is generated by sliding with the collector ring 107 and the brush 111 is prevented from dispersing in AC generator 100 for vehicles.

0005

Problem(s) to be Solved by the Invention However, in conventional AC generator 100 for vehicles, since the parts from which complicated shape becomes a wrap sake seal ring 117 about the collector ring 107 and the brush 111 are needed, when a man day with a group increases, the problem that the manufacturing cost is raised considerably has arisen.

0006 The purpose of claim 1 and claim 2 Though a seal ring is abolished, as the purpose of the invention according to claim 1 can prevent protection of contact and contact, and scattering of worn powder, there is in providing the dynamo-electric machine which can reduce a manufacturing cost by reducing part mark.

0007 The purpose of claim 3 The purpose of the invention according to claim 3 is to provide the dynamo-electric machine which makes the rotary place of a rotor measurable by continuing generating fixed magnetic flux with a permanent magnet.

0008

Means for Solving the Problem

Composition of claim 1 A shaft which was supported as for the invention according to claim 1 enabling free rotation in housing, A rotor which has a rotor core fixed to a periphery of this shaft, and the rotor coil looped around this rotor core, Contact which was provided in an outer periphery of end of said shaft, and was electrically connected to said rotor coil, Contact in contact with a periphery of this contact, and a sensor magnetic pole of approximate circle ring plate shape which is fixed to said contact side of said shaft so that said contact may be covered, and makes magnetic flux, It was provided so that said contact might be covered with this sensor magnetic pole, and an arts means provided with a position sensing device of arc shape which detects magnetic flux from said sensor magnetic pole, and measures a rotary place of said rotor was adopted.

0009 An operation of claim 1 According to the invention according to claim 1, if a shaft and a rotor rotate, a sensor magnetic pole fixed to the contact side of a shaft will rotate. Since magnetic flux is made from a sensor magnetic pole at this time, a rotary place of a rotor is measured by detecting that magnetic flux with a position sensing device. When contact slides on a periphery of contact by rotation of a shaft, it is generated by worn powder, but since contact is surrounded with a sensor magnetic pole of approximate circle ring plate shape, and a position sensing device of arc shape, the worn powder does not disperse in a dynamo-electric machine. Since contact is surrounded with a sensor magnetic pole and a position sensing device, neither water nor a foreign matter invades between contact from the exterior.

0010 An effect of claim 1 Though the invention according to claim 1 is abolished a seal ring, since protection of contact and contact and scattering of worn powder can be prevented, when part mark reduce, it can reduce a manufacturing cost.

0011 Composition of claim 2 Integral moulding of the invention according to claim 2 was carried out to a bearing in which said housing positions said shaft in addition to the dynamo-electric machine according to claim 1, a bearing attaching part holding this bearing, and this bearing attaching part, and an arts means which has the contact-ed wrap covering section for a periphery of said contact was adopted.

0012 An operation and an effect of claim 2 Since integral moulding of the contact covering section is carried out to a bearing attaching part of housing according to the invention according to claim 2, protection of contact and contact and scattering of worn powder can be prevented.

0013 Composition of claim 3 In addition to the dynamo-electric machine according to claim 1 or 2, said sensor magnetic pole was fixed to an annulus ring board which consists of magnetic materials, and said contact side of this annulus ring board, and the invention according to claim 3 is an even pitch Interval, and adopted as a hoop direction an arts means which has the circular permanent magnet magnetized in shaft orientations.

0014An operation and an effect of claim 3 According to the invention according to claim 3, since a position sensing device can detect magnetic flux from a sensor magnetic pole certainly by continuing generating fixed magnetic flux with a permanent magnet, measurement of a rotary place of a rotor is attained.

0015

Embodiment of the Invention

Composition of an example Drawing 1 thru/or drawing 3 are what showed the example which applied the dynamo-electric machine of this invention to the generator motor as an AC generator for vehicles, and drawing 1 is a figure showing that generator motor.

0016The generator motor 1 performs engine start up and drive assistance of auxiliary machinery as an electric motor for vehicles, and it supplies charge of a battery, and the electric power to electric load as an AC generator for vehicles (what is called an AC dynamo). This generator motor 1 is provided with the following.

Housing 2 which forms a coat.

The stator 3 held on the cylinder shaft at the inner surface of the housing 2.

The rotor 4 turning around the inside of this stator 3, the shaft 5 which penetrates the central part of this rotor 4.

V RIBUDO belt pulley 6 arranged in the end part (tip part) of this shaft 5, The collector rings 7 and 8 of the couple arranged at the other end (rear end part) of the shaft 5, the brush device 9 arranged so that it may slide on the periphery of these collector rings 7 and 8, and the rotor position sensing device 10 which detects the relative position of the rotor 4 to the stator 3.

0017Next, the housing 2 is explained based on drawing 1. This housing 2 comprises rear cover 13 grade combined with the front housing 11 of outline bowl shape, the rear housing 12 of the outline bowl shape combined with the rear-side of this front housing 11, and the rear-side of this rear housing 12. Integral moulding of the front housing 11 is carried out with aluminum die-casting, it has the bearing attaching part 15 which supports the end side of the shaft 5 via the bearing (bearing) 14 enabling free rotation, and many holes for aeration of cooling wind blows (not shown) are carrying out the opening. This bearing attaching part 15 is a side attachment wall holding the bearing 14.

0018Integral moulding of the rear housing 12 is carried out with aluminum die-casting, It has the bearing attaching part 17 which supports the end side of the shaft 5 via the bearing (bearing) 16 enabling free rotation, and the collector ring cover part 18 extended from this bearing attaching part 17 at the back end side, and many holes for aeration of cooling wind blows (not shown) are carrying out the opening. This bearing attaching part 17 is a side attachment wall holding the bearing 16. The collector ring cover part 18 is the contact covering section of this invention, and it is formed in the shape of approximately horseshoe shape so that the collector rings 7 and 8 of a couple may be covered with the brush device 9. The rear housing 12 is being bound tight and fixed to the front housing 11 by two or more conclusion implements 19, such as a stud bolt and a nut.

0019By carrying out press forming of the metal plates, such as aluminum, integral moulding of the rear cover 13 was carried out, and it has accommodated the collector rings 7 and 8, the brush device 9, and the rotor position sensing device 10 of a couple between the rear housing 12. The hole 20 for aeration of cooling wind blows is carrying out the opening of many rear covers 13, and they are bound tight to the rear housing 12 with two or more conclusion implements 21, such as a bolt and a screw thread, and are being fixed.

0020Next, the stator 3 is explained based on drawing 1. This stator 3 is the stator core (it is also called a stator core and an armature core) 22 which was pressed fit in the inner circumference of the front housing 11, and was united with it, and the stator which comprised stator-coil (it is also called stator winding and armature winding) 23 grade of the three phase wound around this stator core 22. The stator core 22 is the laminated core which accumulated the sheet shaped griddle, counters the peripheral face of the rotor 4, and is allotted, and many slots (not shown) are formed in the inner circumference side at equal intervals.

0021It is looped around many slots of the stator core 22, and is connected by Y connection or delta connection, and a three phase alternating current output induces the stator coil 23 of a three phase with rotation of the rotor 4. The terminal wire of the stator coil 23 of a three phase is mechanically connected to the external connection terminal 25 of the connector 24 via the fastening bolt 26. The connector 24 is held at the opening formed in the rear cover 13, and is

being fixed by the conclusion implement which is not illustrated to the rear housing 12. The external connection terminal 25 is connected to the three phase rectification circuit (not shown) which rectifies the three phase alternating current generated with the stator coil 23 of the three phase, and is changed into a direct current, and the three phase drive circuit (not shown) which supplies three phase alternating current to the stator coil 23 of a three phase.

0022Next, the rotor 4 is explained based on drawing 1. This rotor 4 is a portion which works as a field, and rotates in one with the shaft 5. And the rotor 4 is high power, is the purpose of attaining a miniaturization, improving vibration resistance nature and raising endurance, and are two Landell type field cores (it abbreviates to a field core below.). It has the two rotor coils (it is also called the rotor winding and the field winding) 33 and 34 grades which were looped around 31 called a rotor core, a rotor core, and field core, 32, and these field cores 31 and 32.

0023The two field cores 31 and 32 were provided with the nail-like pole section by which integral moulding was carried out, and have attached the cooling fans 35 and 36 for absorbing cooling wind blows in the housing 2 to each-side-walls side using means, such as welding. The two rotor coils 33 and 34 are wound around each center section of the two field cores 31 and 32 via a coil bobbin, and each terminal wire is covered by the insulating tube 37, and they are electrically connected to the two shaft connection bars (collector ring terminal) 38. The connection section of the terminal wire of the two rotor coils 33 and 34 and the shaft connection bar 38 is covered with the electric insulation resin 39, such as an epoxy system.

0024Next, the shaft 5 is explained based on drawing 1. This shaft 5 is supported by the bearing attaching parts 15 and 17 via the bearings 14 and 16, enabling free rotation. And the two field cores 31 and 32 have adhered to the center-section periphery of the shaft 5, after having been inserted in by press fit.

0025Next, V RIBUDO belt pulley 6 is explained based on drawing 1. This V RIBUDO belt pulley 6 is connected with the belt pulley for poly V belts (for example, crankshaft pulley) with which the engine output shaft was equipped via means of transmitting power, such as a poly V belt. And V RIBUDO belt pulley 6 is in the state pressed by the bearing 14 by the washer faced nut 40, and is being fixed to the tip periphery of the shaft 5. In order to prevent carrying out relative rotating to the shaft 5, the key 41 inserted in the key groove of the shaft 5 is formed in V RIBUDO belt pulley 6.

0026Next, the collector rings 7 and 8 of a couple are explained based on drawing 1. The collector rings 7 and 8 of a couple are contact of this invention, it consists of metal annulus ring material, such as copper or stainless steel, one side is connected to the anode side of a battery, and another side is connected to the negative-electrode side. The collector rings 7 and 8 of these couples are connected to the two shaft connection bars 38 via two electric conduction lines (not shown). Molding of these electric conduction lines is carried out into the electric insulation resin (not shown) provided in the shaft 5 in one.

0027Next, the brush device 9 is explained based on drawing 1. This brush device 9 comprises brush holder 53 grade which accommodates the brushes 51 and 52 of a couple, and these brushes 51 and 52. The brushes 51 and 52 of a couple are contact of this invention, they consist of electrographite or metal black lead, and they are formed so that it may **** to the peripheral face of the collector rings 7 and 8 of a couple. With the brush springs 54 and 55 accommodated in the brush holder 53, these brushes 51 and 52 are pressed by the peripheral face of the collector rings 7 and 8 of a couple, and slide on the surface of the collector rings 7 and 8 of a couple with rotation of the collector rings 7 and 8 of a couple.

0028The pigtail 56 by which the same shaping was carried out with the brushes 51 and 52 of the couple is held, and the brush holder 53 is allotted so that the circumference of the collector rings 7 and 8 of a couple may be covered to cylindrical shape with the collector ring cover part 18 of the rear housing 12. This brush holder 53 is put by the conclusion implement 19 with the coupler 57 holding an external connection terminal (not shown) between the bearing attaching part 17 of the rear housing 12, and the rear cover 13.

0029Next, the rotor position sensing device 10 is explained based on drawing 1 thru/or drawing 3. Drawing 2 is a figure showing a sensor magnetic pole here, and drawing 3 is a figure showing a position sensing device. This rotor position sensing device 10 comprises the magnetic pole retainer board 61, the sensor magnetic pole 62, and position sensing device 63 grade.

0030The magnetic pole retainer board 61 is an annulus ring board of this invention, and it consists of ferromagnetic materials, has the four round holes 65 which the conclusion implements

64, such as a screw thread, penetrate to the inner circumference side, and is bound tight and fixed to the other end face of the shaft 5 using the conclusion implement 64, and it rotates with the shaft 5. It consists of an outline annulus ring-like permanent magnet, and beforehand, the south pole and a n pole are even pitch by turns, and are magnetized by shaft orientations at the circumferential direction, and the sensor magnetic pole 62 is being fixed to the annulus ring-shaped magnetic pole retainer board 61 with adhesives etc. This sensor magnetic pole 62 is installed so that the rear end part of the shaft 5 may be covered in a circle. Therefore, the sensor magnetic pole 62 has covered the circumference of the collector rings 7 and 8 of a couple with the collector ring cover part 18 and the brush holder 53.

0031The position sensing device 63 comprises electric insulation resin 67 grade of the epoxy system which the electronic circuit (not shown) containing three Hall devices 60 carries out potting of the printed circuit board 66 of the outline sector printed by etching etc., and the electronic circuit, and insulates from the surrounding electrical part electrically.

0032By detecting magnetic flux, three Hall devices 60 are the magnetic flux detecting means which detect the relative position of each nail-like pole section of the field core of the rotor 4 to the stator 3, and output a sensor signal to a control device (not shown) via the lead 68. The printed circuit board 66 is arranged so that the collector ring cover part 18 of the rear housing 12 may be countered via the sensor magnetic pole 62 and minute clearance, it uses the conclusion implements 69, such as a screw thread, for the collector ring cover part 18, binds tight to it, and is being fixed to it. The printed circuit board 66 has covered the circumference of the collector rings 7 and 8 of a couple with the collector ring cover part 18 and the brush holder 53. 70 is an insertion hole which the conclusion implement 69 inserts in.

0033**Function of Example(s)**Next, an operation of the generator motor 1 is briefly explained based on drawing 1 thru/or drawing 3.

00341) When using the generator motor 1 as an electric motor for vehicles, at the time of engine start up, alternating current is supplied one by one to the stator coil 23 of a three phase by the three phase drive circuit. A direct current is supplied to the two rotor coils 33 and 34 via the brushes 51 and 52 of a couple, and the collector rings 7 and 8 of a couple. Then, each stator coil 23 and each rotor coils 33 and 34 serve as an electromagnet, and the rotor 4 rotates within the stator 3 with the shaft 5. When the torque of this shaft 5 is transmitted to the belt pulley for V RIBUDO belt pulley 6, a poly V belt, and poly V belts and gets across to an engine output shaft (crankshaft), an engine starts.

0035At this time, by rotation of the shaft 5, the sensor magnetic pole 62 also rotates, the position sensing device 63 detects change of that magnetic flux, and a rotor position signal is outputted to an external control device. This rotor position signal detects the relative position of each nail-like pole section of the field cores 31 and 32 of the rotor 4 to the stator 3. The control device which inputted this rotor position signal controls the alternating current supplied to the stator coil 23 of a three phase one by one so that the hand of cut of the rotor 4 is a certain direction and predetermined revolving speed is obtained.

00362) If an engine starts when using the generator motor 1 as a dynamo for vehicles, engine rotational motion power will be transmitted to the belt pulley for poly V belts, a poly V belt, and V RIBUDO belt pulley 6, and the shaft 5 will rotate. On the other hand, the two rotor coils 33 and 34 will be magnetized and the rotor 4 will serve as an electromagnet, if a direct current is supplied via the brushes 51 and 52 of a couple, and the collector rings 7 and 8 of a couple.

0037When the rotor 4 rotates the inside of the stator 3 in this state, to the stator coil 23 of a three phase around which the stator core 22 was wound, alternating current induces one by one, and power generation voltage rises quickly. It is inputted and rectified by the three phase rectification circuit via the connector 24, and the alternating current of this three phase changes to a direct current. The direct current voltage rectified in the three phase rectification circuit charges a battery, or electric power is supplied to electric load.

0038As mentioned above, when the rotor 4 rotates the inside of the stator 3, from the brushes 51 and 52 of a couple, and the collector rings 7 and 8 of a couple. The worn powder by both sliding may discharge, it may adhere to the electrical part in the housing 2, for example, a contact button, a diode, winding, etc., and faults, such as insulation deterioration and a ground, may be brought about. On the other hand, when the generator motor 1 carries out water, the water which permeated into the housing 2 from the exterior may touch the brushes 51 and 52 of a couple, and the collector rings 7 and 8 of a couple, may carry out anomalous attrition of these, and may

contract the life of the generator motor 1.

0039Effect of Example(s)However, the generator motor 1 of this example not only in the collector ring cover part 18 of the rear housing 12 for protecting the brushes 51 and 52 of a couple, and the collector rings 7 and 8 of a couple, and the brush holder 53, The sensor magnetic pole 62 and the position sensing device 63 are arranged so that the circumference of the collector rings 7 and 8 of a couple may be surrounded.

0040As a result, in order that the worn powder by which it is generated by sliding with the brushes 51 and 52 of a couple and the collector rings 7 and 8 of a couple may not discharge outside from the space surrounded by the collector ring cover part 18 and the brush holder 53, It adheres to the electrical part in the housing 2, for example, a contact button, a diode, winding, etc., and faults, such as insulation deterioration and a ground, can be avoided. Since the brushes 51 and 52 of a couple and the collector rings 7 and 8 of a couple can be certainly protected from the exterior of the housing 2 against the water which permeates into the rear cover 13, the life-span of the generator motor 1 can be extended.

0041Therefore, when using the generator motor 1 as an electric motor for vehicles, by surrounding the brushes 51 and 52 of a couple, and the collector rings 7 and 8 of a couple with the required rotor position sensing device 10, the seal ring 117 as shown in drawing 4 becomes unnecessary, and the reduction of part mark can be attained. Thereby, since the product cost of the generator motor 1 can be reduced, the prices of the vehicles carrying such a cheap generator motor 1 can be reduced.

0042Modification(s)In this example, although this invention was applied to the generator motor 1, it may apply to the electric motor which only drives. In this example, a sensor magnetic pole 62 rotation-side may form the sensor magnetic pole 62 in the fixed side and position sensing device 63 rotation-side, although the position sensing device 63 was formed in the fixed side.

0043Although the collector rings 7 and 8 of the couple were used in this example as contact which the brushes 51 and 52 of a couple contact, a commutator (commutator) may be used as contact. In this example, although the position sensing device was fixed to the rear housing 12, a position sensing device may be fixed to the holddown member of others which are located near the collector rings, such as a brush holder.

Brief Description of the Drawings

Drawing 1It is a sectional view showing the entire structure of a generator motor (EXAMPLE).

Drawing 2The front view in which (a) showed the sensor magnetic pole, and (b) are the sectional views showing a sensor magnetic pole (EXAMPLE).

Drawing 3It is a front view showing a position sensing device (EXAMPLE).

Drawing 4It is a sectional view showing the entire structure of the AC generator for vehicles (PRIOR ART).

Description of Notations

- 1 Generator motor (dynamo-electric machine)
- 2 Housing
- 3 Stator
- 4 Rotor
- 5 Shaft
- 7 Collector ring (contact)
- 8 Collector ring (contact)
- 9 Brush device
- 10 Rotor position sensing device
- 16 Bearing (bearing)
- 17 Bearing attaching part
- 18 Collector ring cover part (contact covering section)
- 51 Brush (contact)
- 52 Brush (contact)
- 61 Magnetic pole retainer board (annulus ring board)
- 62 Sensor magnetic pole (permanent magnet)
- 63 Position sensing device

Drawing 1ID=000003
**Drawing 2**ID=000004
**Drawing 3**ID=0000
**Drawing 4**ID=000006

